

## SCOPE OF CLAIMS

1. A transmission time difference measurement method in a system having a terminal, two or more base stations that each operate asynchronously, and a control device for controlling the terminal and each of the base stations, said method calculating transmission time differences of signals in each of said  
5 base stations and comprising steps wherein:

when said terminal is able to simultaneously receive signals from each of said base stations,

each of said base stations uses a round trip time measurement function to measure the round trip times of signals to and from said terminal;

10 said terminal uses a turn-around time measurement function to measure, for each of said base stations, the turn-around time from the reception of a signal from the base station until the transmission of a signal to that base station;

said terminal uses an arrival time difference measurement function to  
15 measure the arrival time difference, which is the difference between the times that signals arrive from each of said base stations; and

said control device finds the difference in transmission times of signals in each of said base stations based on: the difference of propagation times between said terminal and each of said base stations that is calculated by  
20 subtracting the turn-around time that is measured in said terminal from the round trip time that is measured in each of said base stations, and the arrival time difference that is measured in said terminal; and uses a storage function to store the calculated transmission time differences in association with the calculation times at which the transmission time differences were calculated.

2. The transmission time difference measurement method according to claim 1, wherein each of said terminal, said base stations, and said control device carries out the processes of said steps only when said terminal is able to simultaneously receive signals from each of said base stations, and  
5 moreover, when said terminal is a specific terminal that satisfies predetermined conditions.

3. The transmission time difference measurement method according to claim 2, wherein, as said predetermined conditions, said turn-around time measurement function and said arrival time difference measurement function of said terminal can be realized with measurement accuracy that equals or  
5 exceeds measurement accuracy that has been prescribed in advance.

4. The transmission time difference measurement method according to claim 2, wherein, as said predetermined conditions, the number of times that said terminal has used said turn-around time measurement function and said arrival time difference measurement function to carry out measurements  
5 satisfies a predetermined condition.

5. The transmission time difference measurement method according to claim 2, further comprising a step wherein said terminal uses a reception quality measurement function to measure the reception quality of signals received from each of said base stations;  
5 wherein, as said predetermined conditions, said reception quality that has been measured using said reception quality measurement function of said terminal satisfies a predetermined condition.

6. The transmission time difference measurement method according to claim 2, wherein, as said predetermined conditions, the transmission time differences of each of said base stations that have not been stored using said

storage function, or the difference between the current time and said

5 calculation time of said transmission time differences that have been stored  
using said storage function satisfies a predetermined condition.

7. The transmission time difference measurement method according  
to claim 2, wherein, as said predetermined conditions, said turn-around time  
measurement function and said arrival time difference measurement function of  
said terminal can be realized with measurement accuracy that equals or  
5 exceeds measurement accuracy that has been prescribed in advance, and  
moreover, the number of times that said terminal uses said turn-around time  
measurement function and said arrival time difference measurement function to  
carry out measurements satisfies a predetermined condition.

8. The transmission time difference measurement method according  
to claim 2, further comprising a step wherein said terminal uses a reception  
quality measurement function to measure the reception quality of signals  
received from each of said base stations;

5 wherein, as said predetermined conditions, said turn-around time  
measurement function and said arrival time difference measurement function of  
said terminal can be realized with measurement accuracy that equals or  
exceeds measurement accuracy that has been prescribed in advance, and  
moreover, said reception quality that has been measured using said reception  
10 quality measurement function of said terminal satisfies a predetermined  
condition.

9. The transmission time difference measurement method according  
to claim 2, wherein, as said predetermined conditions, said turn-around time  
measurement function and said arrival time difference measurement function of  
said terminal can be realized with measurement accuracy that equals or

5 exceeds measurement accuracy that has been prescribed in advance, and  
moreover, the transmission time differences of each of said base stations that  
have not been stored using said storage function, or the difference between the  
current time and said calculation time of said transmission time differences that  
have been stored using said storage function satisfies a predetermined  
10 condition.

10. The transmission time difference measurement method according  
to claim 2, further comprising a step wherein said terminal uses a reception  
quality measurement function to measure the reception quality of signals  
received from each of said base stations;

5 wherein, as said predetermined conditions, the number of times that  
said terminal has used said turn-around time measurement function and said  
arrival time difference measurement function to carry out measurements  
satisfies a predetermined condition, and moreover, said reception quality that  
has been measured using said reception quality measurement function of said  
10 terminal satisfies a predetermined condition.

11. The transmission time difference measurement method according  
to claim 2, wherein as said predetermined conditions, the number of times that  
said terminal has used said turn-around time measurement function and said  
arrival time difference measurement function to carry out measurements  
5 satisfies a predetermined condition, and moreover, the transmission time  
differences of each of said base stations that have not been stored using said  
storage function, or the difference between the current time and said  
calculation time of said transmission time differences that have been stored  
using said storage function satisfies a predetermined condition.

12. The transmission time difference measurement method according to claim 2, further comprising a step wherein said terminal uses a reception quality measurement function to measure the reception quality of signals received from each of said base stations;

5 wherein, as said predetermined conditions, said reception quality that has been measured using said reception quality measurement function of said terminal satisfies a predetermined condition, and moreover, the transmission time differences of each of said base stations that have not been stored using said storage function, or the difference between the current time and said  
10 calculation time of said transmission time differences that have been stored using said storage function satisfies a predetermined condition.

13. The transmission time difference measurement method according to claim 2, further comprising a step wherein said terminal uses a reception quality measurement function to measure the reception quality of signals received from each of said base stations;

5 wherein, as said predetermined conditions, said turn-around time measurement function and said arrival time difference measurement function of said terminal can be realized with measurement accuracy that equals or exceeds measurement accuracy that has been prescribed in advance, the number of times that said terminal has used said turn-around time  
10 measurement function and said arrival time difference measurement function to carry out measurements satisfies a predetermined condition, and moreover, said reception quality that has been measured using said reception quality measurement function of said terminal satisfies a predetermined condition.

14. The transmission time difference measurement method according to claim 2, wherein, as said predetermined conditions, said turn-around time

measurement function and said arrival time difference measurement function of  
said terminal can be realized with measurement accuracy that equals or  
5 exceeds measurement accuracy that has been prescribed in advance, the  
number of times that said terminal has used said turn-around time  
measurement function and said arrival time difference measurement function to  
carry out measurements satisfies a predetermined condition, and moreover,  
the transmission time differences of each of said base stations that have not  
10 been stored using said storage function, or the difference between the current  
time and said calculation time of said transmission time differences that have  
been stored using said storage function satisfies a predetermined condition.

15. The transmission time difference measurement method according  
to claim 2, further comprising a step wherein said terminal uses a reception  
quality measurement function to measure the reception quality of signals  
received from each of said base stations;

5 wherein, as said predetermined conditions, the number of times that  
said terminal has used said turn-around time measurement function and said  
arrival time difference measurement function to carry out measurements  
satisfies a predetermined condition, said reception quality that has been  
measured using said reception quality measurement function of said terminal  
10 satisfies a predetermined condition, and moreover, the transmission time  
differences of each of said base stations that have not been stored using said  
storage function, or the difference between the current time and said  
calculation time of said transmission time differences that have been stored  
using said storage function satisfies a predetermined condition.

16. The transmission time difference measurement method according  
to claim 2, further comprising a step wherein said terminal uses a reception

quality measurement function to measure the reception quality of signals received from each of said base stations;

5            wherein, as said predetermined conditions, said turn-around time measurement function and said arrival time difference measurement function of said terminal can be realized with measurement accuracy that equals or exceeds measurement accuracy that has been prescribed in advance, the number of times that said terminal has used said turn-around time  
10 measurement function and said arrival time difference measurement function to carry out measurements satisfies a predetermined condition, said reception quality that has been measured using said reception quality measurement function of said terminal satisfies a predetermined condition, and moreover, the transmission time differences of each of said base stations that have not been  
15 stored using said storage function, or the difference between the current time and said calculation time of said transmission time differences that have been stored using said storage function satisfies a predetermined condition.

17.    The transmission time difference measurement method according to claim 1, wherein, when said control device has already used said storage function to store transmission time differences,

5            said control device calculates the average value of said transmission time differences that have already been stored using said storage function and said transmission time differences that have been calculated, and uses said storage function to store the average value that has been calculated as said transmission time differences.

18.    The transmission time difference measurement method in a system having a terminal, two or more base stations that each operate asynchronously, and a control device for controlling the terminal and each of

the base stations, said method calculating the differences in transmission times  
5 of signals in each of said base stations and comprising steps wherein:

when said terminal is able to simultaneously receive signals from each  
of said base stations,

said terminal uses an arrival time difference measurement function to  
measure the arrival time difference, which is the difference between the times  
10 that signals arrive from each of said base stations, and, using a GPS  
positioning function, uses signals from a GPS satellite to specify the  
geographical location of said terminal; and

said control device calculates the distances between said terminal and  
each of said base stations based on the geographical location of said terminal  
15 and the geographical locations of each of said base stations that have been  
measured by said terminal, finds the transmission time differences of each of  
said base stations based on the propagation time differences that are  
calculated by dividing the differences between the calculated distances by the  
speed of light and the arrival time differences that are measured at said  
20 terminal, and uses the storage function to store the transmission time  
differences that have been calculated in association with the calculation time at  
which the transmission time differences were calculated.

19. The transmission time difference measurement method according  
to claim 18, wherein each of said terminal and said control device carries out  
the processes of said steps only when said terminal can simultaneously  
receive signals from each of said base stations, and moreover, said terminal is  
5 a specific terminal that satisfies predetermined conditions.

20. The transmission time difference measurement method according  
to claim 19, further comprising a step wherein said terminal uses a reception



quality measurement function to measure the reception quality of signals received from each of said base stations;

5            wherein, as said predetermined conditions, said reception quality that is measured using said reception quality measurement function of said terminal satisfies a predetermined condition.

21.    The transmission time difference measurement method according to claim 19, wherein, as said predetermined conditions, the transmission time differences of each of said base stations that have not been stored using said storage function, or the difference between the current time and said  
5    calculation time of said transmission time differences that have been stored using said storage function satisfies a predetermined condition.

22.    The transmission time difference measurement method according to claim 19, further comprising a step wherein said terminal uses a reception quality measurement function to measure the reception quality of signals received from each of said base stations;

5            wherein, as said predetermined conditions, said reception quality that has been measured using said reception quality measurement function of said terminal satisfies a predetermined condition, and moreover, the transmission time differences of each of said base stations that have not been stored using said storage function, or the difference between the current time and said  
10    calculation time of said transmission time differences that have been stored using said storage function satisfies a predetermined condition.

23.    The transmission time difference measurement method according to claim 18, wherein, when said control device has already used said storage function to store said transmission time differences,

said control device calculates the average value of said transmission  
5 time differences that have already been stored using said storage function and  
said transmission time differences that have been calculated, and uses said  
storage function to store the average value that has been calculated as said  
transmission time difference.

24. A transmission time difference measurement system comprising  
a terminal, two or more base stations that each operate asynchronously, and a  
control device for controlling said terminal and each of said base stations, said  
system calculating the transmission time differences of signals in each of said  
5 base stations; wherein:

said control device includes: a measurement request means for issuing  
requests for measurement to said terminal and said base stations; and storage  
means for storing the transmission time differences of signals of said base  
stations in association with calculation times at which said transmission time  
10 differences have been calculated;

each of said base stations includes a round trip time measurement  
means for, upon receiving a measurement request that said control device has  
transmitted using said measurement request means, measuring the round trip  
times of signals transmitted to and from said terminal; and

15 said terminal includes: a turn-around time measurement means for,  
upon receiving a measurement request that said control device has transmitted  
using said measurement request means, measuring the turn-around time for  
receiving signals from said base stations until transmitting the signals to said  
base stations; and an arrival time difference measurement means for  
20 measuring the arrival time difference, which is the difference between the times  
at which signals from at least two base stations arrive;

and wherein, when said terminal is able to simultaneously receive signals from each of said base stations:

each of said base stations carries out a process of using said round trip  
25 time measurement means to measure each of the round trip times;

said terminal carries out processes of using said turn-around time measurement means to measure turn-around times for each of said base stations and of using said arrival time difference measurement means to measure arrival time differences; and

30 said control device carries out processes of: finding the transmission time differences of signals in each of said base stations based on the propagation time differences between said terminal and each of said base stations that are calculated by subtracting the turn-around time that is measured in said terminal from the round trip times that have been measured  
35 in each of said base stations, and the arrival time difference that is measured in said terminal; and storing in said storage means the transmission time differences that have been calculated.

25. The transmission time difference measurement system according to claim 24, wherein said terminal, each of said base stations, and said control device carry out said processes only when said terminal is able to simultaneously receive signals from each of said base stations, and moreover,  
5 when said terminal is a specific terminal that satisfies predetermined conditions.

26. The transmission time difference measurement system according to claim 25, wherein, as said predetermined conditions, said turn-around time measurement means and said arrival time difference measurement means of said terminal are able to measure with measurement accuracy that equals or  
5 exceeds measurement accuracy that has been prescribed in advance.

27. The transmission time difference measurement system according to claim 25, wherein, as said predetermined conditions, the number of times that said terminal uses said turn-around time measurement means and said arrival time difference measurement means to carry out measurements  
5 satisfies a predetermined condition.

28. The transmission time difference measurement system according to claim 25, wherein said terminal further includes a reception quality measurement means for measuring the reception quality of signals received from each of said base stations;  
5 wherein, as said predetermined conditions, said reception quality that has been measured using said reception quality measurement means of said terminal satisfies a predetermined condition.

29. The transmission time difference measurement system according to claim 25, wherein, as said predetermined conditions, the transmission time differences of each of said base stations that have not been stored in said storage means, or the difference between the current time and said calculation  
5 time of said transmission time differences that have been stored in said storage means satisfies a predetermined condition.

30. The transmission time difference measurement system according to claim 25, wherein, as said predetermined conditions, said turn-around time measurement means and said arrival time difference measurement means of said terminal are able to carry out measurements with measurement accuracy  
5 that equals or exceeds measurement accuracy that has been prescribed in advance, and moreover, the number of times that said terminal uses said turn-around time measurement means and said arrival time difference

measurement means to carry out measurements satisfies a predetermined condition.

31. The transmission time difference measurement system according to claim 25, wherein said terminal further includes reception quality measurement means for measuring the reception quality of signals received from each of said base stations; and

5 wherein, as said predetermined conditions, said turn-around time measurement means and said arrival time difference measurement means of said terminal are able to measure with measurement accuracy that equals or exceeds measurement accuracy that has been prescribed in advance, and moreover, said reception quality that has been measured using said reception  
10 quality measurement means of said terminal satisfies a predetermined condition.

32. The transmission time difference measurement system according to claim 25, wherein, as said predetermined conditions, said turn-around time measurement means and said arrival time difference measurement means of said terminal can carry out measurements with measurement accuracy that  
5 equals or exceeds measurement accuracy that has been prescribed in advance, and moreover, the transmission time differences of each of said base stations that have not been stored in said storage means, or the difference between the current time and said calculation time of said transmission time  
- differences that have been stored in said storage means satisfies a  
10 predetermined condition.

33. The transmission time difference measurement system according to claim 25, wherein said terminal further includes reception quality

measurement means for measuring the reception quality of signals received from each of said base stations; and

5            wherein, as said predetermined conditions, the number of times that said terminal uses said turn-around time measurement means and said arrival time difference measurement means to carry out measurements satisfies a predetermined condition, and moreover, said reception quality that has been measured using said reception quality measurement means of said terminal  
10          satisfies a predetermined condition.

34.    The transmission time difference measurement system according to claim 25, wherein, as said predetermined conditions, the number of times that said terminal uses said turn-around time measurement means and said arrival time difference measurement means to carry out measurements  
5          satisfies a predetermined condition, and moreover, the transmission time differences of each of said base stations that have not been stored in said storage means, or the difference between the current time and said calculation time of said transmission time differences that have been stored in said storage means satisfies a predetermined condition.

35.    The transmission time difference measurement system according to claim 25, wherein said terminal further includes reception quality measurement means for measuring the reception quality of signals received from each of said base stations; and  
5           as said predetermined conditions, said reception quality that has been measured using said reception quality measurement means of said terminal satisfies a predetermined condition, and moreover, the transmission time differences of each of said base stations that have not been stored in said storage means, or the difference between the current time and said calculation

10 time of said transmission time differences that have been stored in said storage means satisfies a predetermined condition.

36. The transmission time difference measurement system according to claim 25, wherein said terminal further includes reception quality measurement means for measuring the reception quality of signals received from each of said base stations; and

5 as said predetermined conditions, said turn-around time measurement means and said arrival time difference measurement means of said terminal can carry out measurements with measurement accuracy that equals or exceeds measurement accuracy that has been prescribed in advance, the number of times that said terminal uses said turn-around time measurement  
10 means and said arrival time difference measurement means to carry out measurements satisfies a predetermined condition, and moreover, said reception quality that has been measured using said reception quality measurement means of said terminal satisfies a predetermined condition.

37. The transmission time difference measurement system according to claim 25, wherein, as said predetermined conditions, said turn-around time measurement means and said arrival time difference measurement means of said terminal can carry out measurements with measurement accuracy that  
5 equals or exceeds measurement accuracy that has been prescribed in advance, the number of times that said terminal uses said turn-around time measurement means and said arrival time difference measurement means to carry out measurements satisfies a predetermined condition, and moreover, the transmission time differences of each of said base stations that have not  
10 been stored in said storage means, or the difference between the current time

and said calculation time of said transmission time differences that have been stored in said storage means satisfies a predetermined condition.

38. The transmission time difference measurement system according to claim 25, wherein said terminal further includes reception quality measurement means for measuring the reception quality of signals received from each of said base stations; and

5 as said predetermined conditions, the number of times that said terminal uses said turn-around time measurement means and said arrival time difference measurement means to carry out measurements satisfies a predetermined condition, said reception quality that has been measured using said reception quality measurement means of said terminal satisfies a  
10 predetermined condition, and moreover, the transmission time differences of each of said base stations that have not been stored in said storage means, or the difference between the current time and said calculation time of said transmission time differences that have been stored in said storage means satisfies a predetermined condition.

39. The transmission time difference measurement system according to claim 25, wherein said terminal further includes reception quality measurement means for measuring the reception quality of signals received from each of said base stations; and

5 as said predetermined conditions, said turn-around time measurement means and said arrival time difference measurement means of said terminal can carry out measurements with measurement accuracy that equals or exceeds measurement accuracy that has been prescribed in advance, the number of times that said terminal uses said turn-around time measurement  
10 means and said arrival time difference measurement means to carry out



measurements satisfies a predetermined condition, said reception quality that has been measured using said reception quality measurement means of said terminal satisfies a predetermined condition, and moreover, the transmission time differences of each of said base stations that have not been stored in said storage means, or the difference between the current time and said calculation time of said transmission time differences that have been stored in said storage means satisfies a predetermined condition.

40. The transmission time difference measurement system according to claim 24, wherein, when said transmission time differences are already stored in said storage means, said control means calculates the average value of said transmission time differences that are already stored in said storage means and said transmission time differences that have been calculated, and stores this calculated average value in said storage means as said transmission time differences.

41. The transmission time difference measurement system comprising a terminal, two or more base stations that each operate asynchronously, and a control device for controlling said terminal and each of said base stations, said system calculating the transmission time differences of signals in each of said base stations; wherein:

said control device includes: a measurement request means for issuing requests for measurement to said terminal; and storage means for storing the transmission time differences of signals of said base stations in association with calculation times at which said transmission time differences have been calculated;

said terminal includes an arrival time difference measurement means for, upon receiving a measurement request that said control device has transmitted

using said measurement request means, measuring the arrival time difference,  
which is the difference between the times at which signals from at least two  
15 base stations arrive; and

at least one of said terminal and said control device includes a GPS  
positioning means for using signals from a GPS satellite to specify the  
geographical location of terminals;

and wherein, when said terminal is able to simultaneously receive  
20 signals from each of said base stations:

said terminal carries out a process of using said arrival time difference  
measurement means to measure the arrival time difference;

at least one of said terminal and said control device carries out a  
process of using said GPS positioning means to specify the geographical  
25 location of terminals; and

said control device carries out processes of: calculating the distances  
between said terminal and each of said base stations based on the  
geographical location of said terminal and the geographical locations of each of  
said base stations that have been measured, finds the transmission time  
30 differences of each of said base stations based on the propagation time  
difference that is calculated by dividing the differences in calculated distances  
by the speed of light and the arrival time difference that has been measured at  
said terminal, and storing the transmission time differences that have been  
calculated in said storage means.

42. The transmission time difference measurement system according  
to claim 41, wherein each of said terminal and said control device carry out  
said processes only when said terminal is able to simultaneously receive

signals from each of said base stations, and moreover, when said terminal is a  
5 specific terminal that satisfies predetermined conditions.

43. The transmission time difference measurement system according  
to claim 42, wherein said terminal further includes a reception quality  
measurement means for measuring reception quality of signals received from  
each of said base stations; and

5 wherein, as said predetermined conditions, said reception quality that  
has been measured using said reception quality measurement means of said  
terminal satisfies a predetermined condition.

44. The transmission time difference measurement system according  
to claim 42, wherein, as said predetermined conditions, the transmission time  
differences of each of said base stations that have not been stored in said  
storage means, or the difference between the current time and said calculation  
5 time of said transmission time differences that have been stored in said storage  
means satisfies a predetermined condition.

45. The transmission time difference measurement system according  
to claim 42, wherein said terminal further includes a reception quality  
measurement means for measuring reception quality of signals received from  
each of said base stations; and

5 wherein, as said predetermined conditions, said reception quality that  
has been measured using said reception quality measurement means of said  
terminal satisfies a predetermined condition, and moreover, the transmission  
time differences of each of said base stations that have not been stored in said  
storage means, or the difference between the current time and said calculation  
10 time of said transmission time differences that have been stored in said storage  
means satisfies a predetermined condition.

46. The transmission time difference measurement system according to claim 41, wherein, when said transmission time differences are already stored in said storage means, said control means calculates the average value of said transmission time differences that are already stored in said storage means and said transmission time differences that have been calculated, and  
5 stores this calculated average value in said storage means as said transmission time difference.